

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number  
**WO 2005/086830 A2**

(51) International Patent Classification: Not classified

(21) International Application Number:  
PCT/US2005/007649

(22) International Filing Date: 10 March 2005 (10.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/551,816 10 March 2004 (10.03.2004) US

(71) Applicant (for all designated States except US): **GEORGIA TECH RESEARCH CORPORATION** [US/US];  
505 10th Street, Atlanta, GA 30332-0415 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DICKSON, Robert, Martin** [US/US]; 2969 Dale Drive NE, Atlanta, GA 30305 (US). **ZHENG, Jie** [CN/US]; 2167-J Lake Park Dr., Smyrna, GA 30080 (US). **CAPADONA, Lynn, Anne** [US/US]; 8848 Belton Drive, North Ridgeville, OH 44035 (US). **PETTY, Jeffrey, Thomas** [US/US]; 8 Duchess Ct., Travelers Rest, SC 29690 (US). **PATEL, Sandeep,**

**Ajit** [US/US]; 347 11th Street, Atlanta, GA 30318 (US). **WECK, Marcus** [DE/US]; 915 Argonne Avenue #1, Atlanta, GA 30309 (US).

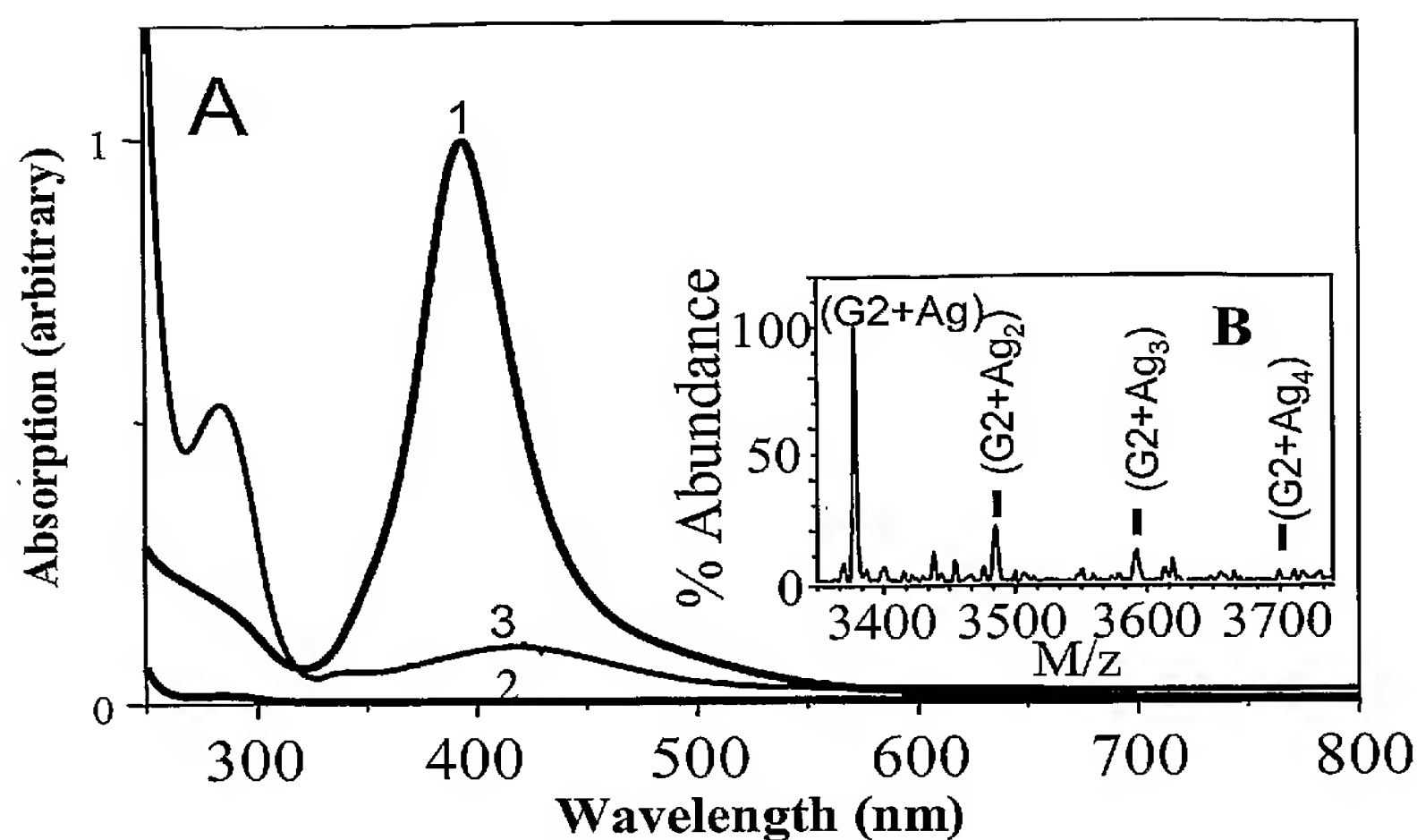
(74) Agents: **WARREN, William, L.** et al.; Sutherland Asbill & Brennan LLP, 999 Peachtree Street NE, Atlanta, GA 30309-3996 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: RAMAN-ENHANCING, AND NON-LINEAR OPTICALLY ACTIVE NANO-SIZED OPTICAL LABELS AND USES THEREOF



(57) Abstract: A composition is disclosed which is capable of being used for detection, comprising an encapsulated noble metal nanocluster. Methods for preparing the encapsulated noble metal nanoclusters, and methods of using the encapsulated noble metal nanoclusters are also disclosed. In certain embodiments, the noble metal nanoclusters are encapsulated by a dendrimer, a peptide, a small organic or inorganic molecule, or an oligonucleotide. The encapsulated noble metal nanoclusters have a characteristic spectral emission, wherein said spectral emission is varied by controlling the nature of the encapsulating material, such as by controlling the size of the nanocluster, the generation of a dendrimer, the incorporation of a functional group, and wherein said emission is used to provide information about a biological state. The emission is selected from the group consisting of nanocluster fluorescence, multiphoton excited nanocluster fluorescence, Stokes or Anti-Stokes Raman emission from the encapsulating material, and second harmonic generation.



FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *without international search report and to be republished upon receipt of that report*